Ecosystem Based Management (EBM) WORKING GROUP
New England Aquarium, Education Center

Boston, MA
9:30am to 5:00pm
23 February 2004

MEETING SUMMARY

ACTION: **Changes to the January 12, 2004 Meeting Summary**
SBNMS staff will make changes to the last meeting's summary

- Page 7: "Unfortunately, some of Grumbine's definition has nebulous terms not easily defined by the scientific members of the WG", will read: "Unfortunately, some of Grumbine's definition has terms that can have wide latitude in their interpretation and meaning."
- Item on page 8: "3. Maximized extraction", will read "3. Sustainable extraction".

ACTION: **Ex-Vessel Landings By Specific Gear Type**
Craig MacDonald to produce a breakdown of ex-vessel value of landings by specific fishing gear types.

ACTION: **Tuna Reports of Non Multi-Species Permit Holders**
Jon Brodziak to provide information to Craig MacDonald concerning tuna catch reports from the SBNMS of non multi-species permit holders.

ACTION: **Bin Terms for Further Definition**
John Williamson asked that the terms ***ecological integrity*** and ***diversity*** be set aside to be further defined by members of the WG

ACTION: **Assignment of Straw Man Management Plans for Three Scenarios**
WG members were asked to produce straw man management plans for the three scenarios mentioned from the last meeting. These scenarios are:

1. National Park Protection/No Extraction
2. Balanced Protection and Extraction
3. Sustainable Extraction

WG members were assigned as core drafters of each scenario. These members are:

Scenario 1: Peter Auster, Susan Farady, Priscilla Brooks
Scenario 2: Jon Brodziak, Les Kaufman
Scenario 3: David Pierce, David Casoni, Ed Barrett, Tom DePersia

SBNMS staff will send an email to all members to inform them of the management plan development. All those members who wish to be involved will be encouraged to contact the core drafters of the straw man management plans

ACTION: **Delivery of Meeting Agendas**
SBNMS staff will provide the WG with meeting agendas at lest one week prior to the meeting date.

ACTION: **Next Meeting**
Next meeting is set for (TBA, WG is polling for dates: April 5, 2004 or April 12, 2004) in Boston at the New England Aquarium, Education Center.

Working Group Attendees (February 23, 2004):

Name	**WG Seat / Affiliation**	**Attendance**
John Williamson	SAC Chair	Present
Ben Cowie-Haskell	Team Lead (SBNMS)	Present
David Wiley	Co-Lead (SBNMS)	Present
Peter Auster	Uconn, NURC	Present
Les Kaufman	Boston University	Not-Present
Ed Barrett	MA Fisherman's Partnership	Present
Priscilla Brooks	CLF	Present
Susan Farady	The Ocean Conservancy	Present
Jerry Hill	Yankee Fleet	Present
Paul Howard	NEFMC	Not-Present
David Pierce	MA DMF	Present
Tony Wilbur	MA CZM	Present
Tom DePersia	Big Fish Charters	Present
Dave Casoni	Commercial Fishing Industry	Present
Larry Madden	WHOI	Not-Present
Jon Brodziak	NOAA Fisheries	Present
Dierdre Kimball	NOAA Fisheries	Present
Technical Advisors		
Pierre Lermusiaux	Harvard University	Not-Present
Joe Green	NOAA OLE	Not-Present
Greg Hitchen	USCG	Not-Present
Kathleen Dolan	MA MEP	Not-Present
Others Present		
Craig MacDonald	SBNMS	
Kevin Chu	NMFS	
Katrina VanDine	SBNMS	
Geoffrey Smith*	The Ocean Conservancy	
Edward Lindelof	NOAA	

* Geoffrey Smith took the place of Susan Farady during the afternoon session of the WG meeting.

WELCOME AND ADOPTION OF AGENDA

John Williamson welcomed the Working Group (WG) and opened the meeting. A motion was made for changes to the summary from the meeting held on January 12, 2004. Changes were suggested by the WG, and pending those changes, the Meeting Summary was accepted.

Williamson stated that the WG goal for this meeting was to finalize a definition for ecosystem- based sanctuary management before the group adjourned. Williamson then introduced Peter Auster, David Wiley, Craig MacDonald and Edward Lindelof, as the presenters for the meeting.

PRESENTATIONS

Habitat Studies in the Stellwagen Bank National Marine Sanctuary (SBNMS)

Peter Auster's presentation was made with the objective of providing the WG with information regarding habitat and fish ecology research in the SBNMS.

Seafloor and Oceanographic Landscapes

Knowledge of seafloor landscapes has improved since work done in 1973. Imagery, specifically multi-beam imagery, has provided highly detailed bathymetry that can infer processes that mediate geologic landscape. Equally important to seafloor landscape is the oceanographic landscape. The oceanographic landscape describes horizontal circulation patterns and vertical movement through the water column. Horizontal circulation patterns can correspond to seafloor landscapes and are important for larval transport. Internal waves, unseen from the surface, are propagated by the interface of two layers of water undergoing wave motion. These layers can be of differing water density (pycnocline) or water temperature (thermocline). Internal waves can affect larval transport and are also important in organism migration and aggregation.

Primary Production of Phytoplankton

Primary production of phytoplankton on the seafloor, though less commonly described, is as important as the primary production on the ocean surface. This benthic primary production drives benthic food webs. Diatoms are the primary taxa for benthic primary production.

Source and Sink Patterns for Passive Larvae

The Gulf of Maine (GOM) circulation model. Used to model larval transport over 30 days at depths of 1, 5, 10, 20, 30 and 50 meters, the GOM circulation model estimates the projected path for passive larvae, given the circulation patterns of the GOM. Areas of larvae generation are used as starting points and the path is projected for a 30-day period. This period is used because 30 and 60 days are the typical durations for larval settlement. Lack of funds prevented 60-day circulation to be modeled. The model predicted larval paths that move in a general east to west direction, however some paths show how larvae can follow eddies and meanders leading out of the GOM. This demonstrates how the GOM is a "leaky system" where passive larvae can be moved out of the GOM.

Fish and Seafloor Landscapes

Environmental correlations for fish change depending on the scale that is being examined. For example:

- At large scales (10-100 km) fish can be correlated with temperature and depth
- At Small scales (km, m, or cm), the correlations become sediment type (for demersal fish) and boundary conditions (for pelagic fish), texture, and biogenic structure.

Data from multiple studies shows deep and shallow fish communities. There is also significant correlation between areas of high abundance of fish and a specific habitat or bottom type. This suggests that fish census can be used to delineate community types and that species can be inferred from habitat types.

Fish as Individuals

It is important to note that individual fish want to decrease their predation risk but maximize their probability to acquire prey. To study this, imaging tools like video and sonar, and remotely operated vehicles (ROV) are used to census fish and bottom types. Individual species can utilize bottom types during different developmental stages. Early juvenile Acadian redfish can be found in large numbers in piled boulders while large numbers of late juvenile Acadian redfish can be found in dense anemone

forests; however, low numbers of adult Acadian redfish are found in these areas. For silver hake, sand wave features (i.e., wave period) have some correlation with fish length. A study using adult cod tagged with acoustic tags has demonstrated that some cod have limited home ranges around gravel habitats. Tagged fish have been located in the same area over a 6-month period, and some over a 1-year period. Gaps in the data suggest that the fish move in and out of the monitoring site. In laboratory experiments, juvenile cod tend to have a decreased predation risk in short sponge habitat.

GOM & SBNMS Species Richness
High-density areas of species richness can be found around the perimeter or the GOM and Georges Bank. Classification of species into the categories of resident, annual migrant, summer migrant, winter migrant, slope, mesopelagic, and coastal for both the GOM and the SBNMS shows that 1/3 of the species can be found in the SBNMS. The Alpha diversity index shows a constant diversity between the GOM and the SBNMS over time while both the Shannon and Simpson indices show some change; however there is no clear trend in diversity for any particular landscape feature.

Human Disturbance
Fishing can remove emergent and attached fauna, smooth sediment bedforms, remove structure-producing fauna, as well as have direct and indirect effects on foodwebs and the ecosystem. To monitor the effects of disturbance, the Seafloor Habitat Recovery Monitoring Program (SHRMP) was set up in the SBNMS. With the laying of the Hibernia Cable through the SBNMS, areas can be compared inside and outside the Western GOM Closure. This can also be compared to fished areas outside and un-fished areas inside the Western GOM Closure. Micro-habitats were identified to be studied, which include piled boulder, rippled sand, mud, cobble, and shell fragment. For sand, there is no significant difference between the inside and outside areas; however, boulders do show some difference. Fragile organisms also show differences in recovery between inside the Western GOM Closure and outside.

Recovery from disturbance can be measured in a decadal time scale. For mud, grab samples analyzed with cluster analysis indicate a difference in trajectories of communities inside the Western GOM Closure versus outside. Sand communities, inside and outside the Western GOM Closure, have less difference. For areas affected by the cable, shallow areas show little difference; however, deep areas inside versus deep areas outside show effects. In addition, it has been discovered that invasive species, such as an introduced tunicate, can have impacts on the GOM ecosystem.

Modeling Studies
Computer modeling studies conducted on habitat patches and movement rates based on density indicate that survivorship of juvenile cod has increased inside the SBNMS. Models also show that the timing of disturbance can influence percent coverage between impacted and natural areas. It is expected that recovery will act in a successional manor, but this is not always the case. The response to disturbance could be non-linear, resulting in differences depending on the timing of the disturbance.

Questions & Answers
Question 1: Was there a standard definition for fishing and were effects from different types of fishing gear looked at?

> ***Answer:*** The standard definition for fishing was any type of removal of fish and that different gear could have different effects, but that the goal was to observe general trends between areas of fishing to areas of no fishing. Information on the impacts of all gear types would be appreciated. John Williamson added that this was needed information and could be topics for future experiments.

Question 2: Was there "good" effects as well as "bad" effects.

Answer: No value judgment was given to the effects studied.

Use of the SBNMS By Humans and Cetaceans
David Wiley's presentation was made with the objective of providing the WG with information regarding the distribution of human and cetacean use of the SBNMS.

Data Collection
Two methods are used to collect whale data in the SBNMS. The fist method consists of standardized surveys using pre-established transects set up within the SBNMS. Observers on research vessels have followed these transects and recorded whale sightings and boat activity. This method can be costly and there are no long-term data sets. The second method utilizes opportunistic data collected by whale watch boats operating within the SBNMS. This method provides daily reports with heavy activity within the sanctuary.

Whale Hotspots
Quintiles are calculated for total whales and by individual species. These quintiles can then be plotted using geographic information systems (GIS) for a graphical representation of whale hotspots. Hotspots can be seen in the northwest and southwest corners of the SBNMS. It is important to note that the data represents the presence of whales that were observed in the Sanctuary, and does not suggest that there are no whales outside the Sanctuary. Also, the hotspots could be an artifact of the heavy whale watch boat activity in those areas. Whale sighting locations can also be compared with bottom type for further analysis. The mean number of whales in the SBNMS shows a cyclical pattern that may cycle with sandlance abundance. Whale abundance also shows seasonal fluctuations.

Whales & Fixed Fishing Gear
Fixed gear fishing activity was measured and compared to whale activity. Buoys were counted within the SBNMS and compared with boats working in the area to discern if the gear was lobster pots or gillnets. The boats are used as a proxy for the type of gear being worked in the area. It was suggested by a member of the WG that bottom type can also help to discern what type of gear is being fished in particular locations, and that the representation was good. A spatial-temporal distribution can be produce using GIS, showing a spread from west to east of gillnet to lobster gear. Another WG member suggested that rolling closures caused gear locations to change, particularly in the southwest corner when mobile gear fishing vessels move into the area. Relative entanglement risk can be assessed showing increased risk in the northwest and southwest corners, with the southwest corner being an area of concern.

Whales & Mobile Fishing Gear
Mobile fishing gear could have potential interactions with whales in the SBNMS. Analysis of vessel sightings in the SBNMS using GIS shows seasonal movement of vessels. Rolling closures can have some effect in dictating where some commercial boats may go. Activity can also be compared to bottom type, and compared with whale sighing data.

Ship Strikes
All commercial shipping track data is reported using the ship reporting system. A major shipping lane runs through the SMNMS and shipping activity is heavy throughout the area. Shipping tracks can be compared with whale sighting data using GIS to help assess the risk of ship strikes. Reports of ship strikes have been increasing over time, but could be do to the fact that all whale watching boats report themselves in the case of an incident. It was suggested by a member of the working group that whale

watch boat strikes should be decreasing do to compliance with guidelines now in place. However, the latest data has not been analyzed.

Ex-Vessel Value of Fish Landings From SBNMS
Craig MacDonald's presentation was made with the objective of providing the WG with information regarding the contribution of the SBNMS to total ex-vessel value of fish landings.

Ex-Vessel Value
Ex-vessel value of fish landings taken from the SBNMS have been broken down by state, Massachusetts county, and by year. Data was collected through Vessel Trip Report (VTR). The numbers shown were not final and could be subject to change and represent the average over the year. Of the four states presented (Maine, New Hampshire, Massachusetts, Rhode Island), Massachusetts was reported to have the most landings of fish taken from the SBNMS. Some members of the WG suggested that the VTRs may not give an accurate account of fish landings taken from the SBNMS. Of the Massachusetts counties (Essex, Suffolk, Norfolk, Plymouth, Barnstable, Nantucket, Dukes, Bristol), Essex, Plymouth and Barnstable report the highest landings of fish from the SBNMS. From the value of fish landings over time from 1994 to 2000, the general trend is an increase in value, though the value of landings in 1994 and 1995 could be a factor of under reporting of small fishing vessels. It was noted that there is very little information on recreational catches in the SBNMS.

SBNMS Authority to Regulate Fishing
Edward Lindelof's presentation was made with the objective of providing the WG with information on the sanctuary's authority to regulate fishing.

Questions Concerning Potential Regulations in the SBNMS
The SBNMS's authority to regulate fishing can be assessed by the following 6 questions:

1. Does SBNMS intend to regulate fishing?
2. Can SBNMS currently regulate fishing?
3. Does SBNMS have authority to regulate fishing?
4. What is the Designation Document and how does it limit SBNMS's ability to regulate activities?
5. In addition to direct sanctuary regulations, what other ways are available to regulate fishing?
6. If SBNMS decides it is necessary to regulate, what steps would the sanctuary have to take to do it?

The answer to these questions are:

1. It is uncertain if SBNMS intends to regulate.
2. As to current regulation, SBNMS does not regulate fishing within the sanctuary.
3. SBNMS does have the authority to regulate activities.
4. The Designation Document includes the mandates of the Sanctuaries Act and documents what activities can be regulated.
5. The SBNMS can work with the Fisheries Management Council to decide whether SBNMS or Council regulations are to be used, and specify the geographic extent of the Council or SBNMS regulations.
6. If the SBNMS decides that regulation is necessary, it must be presented to the Council, and changes to the Designation Document would have to be made. However, if the Council promulgates regulations, no changes to the Designation Document would be needed. There is plenty of flexibility, as well as checks and balances, within this system.

Discussion of Regulations
At this point, the presentation became a discussion of a potential promise made by the National Marine Fisheries Service (NMFS) that no fishing regulations would be made in the SBNMS. The commercial fishing members of the WG produced handouts making reference to the promise of no regulation of commercial fishing in the SBNMS. However, this issue is still under investigation, and to date, wording has not yet been found in past documentation mentioning a promise to not regulate fishing. WG members stressed that it was important that recommendations be given to the SAC and that the debate continue at that level. Other WG members were concerned that fishermen could potentially be left out of the decision-making process, and that the correct wording of regulation issues should be made to gain support from the community. There was also some question as to if the EIS and MP covered this issue, and if the Designation Document already states exemptions. John Williamson added that this process is different than the fisheries management process and that the intent was to bring ideas that the community can get behind. He stressed that fishermen would be included in the process. Williamson also added that if necessary, recommendations could be made by the WG to suggest changes to fisheries management.

PRESENTATION OF PROPOSED DEFINITIONS OF ECOSYSTEM-BASED SANCTUARY MANAGEMENT

The two proposed versions for the definition of ecosystem-based sanctuary management that the scientific members of the WG had written since the last meeting were displayed. Appendix A to this summary contains the versions as presented originally. Peter Auster and Jon Brodziak presented Version 1 and David Pierce presented Version 2.

ROUNDTABEL DISCUSSION OF PROPOSED DEFINITIONS OF ECOSYSTEM-BASED SANCTUARY MANAGEMENT

After the presentations of both versions, the WG was asked to make comments and changes. WG members noted that it was important that the definition be as simple as possible, stating clear terms with stated goals. Also, the WG should avoid getting bogged down with potential implementation issues, and focus on goals.

Definition Version 1
The proposed definition of ecosystem-based sanctuary management, version 1, can be found in Appendix A. Issues raised during this discussion are noted below.

Issue 1: Study Sites
Concern was raised over protecting specified areas. The mention of closed areas could make the definition for ecosystem-based sanctuary management less acceptable. Members also raised concerns about the definition of habit used with this statement.

> ***Discussion:*** Some members of the WG were not comfortable with setting aside specified areas. It was felt that inclusion of this statement was an issue for management and could be items for research ideas that could help in making informed management decisions. However, habitat diversity and complexity were important issues to include in the definition. It was also determined that the definition should have a more friendly tone.

Issue 2: Scale of Definition
WG members were unsure if the definition for ecosystem-based sanctuary management should only cover the sanctuary itself or be at a larger scale such as the entire GOM.

Discussion: Members determined that activities outside the boundaries of the sanctuary could affect the sanctuary itself. The ecosystem is the GOM; it is bigger than the sanctuary alone. The definition did not have to be constrained by the boundaries of the sanctuary. It was important that the SBNMS have adaptive management that could, if necessary, consult the council for issues outside the bounds of the sanctuary.

Definition Version 2
The proposed definition of ecosystem-based sanctuary management, version 2, can be found in Appendix A. Issues raised during this discussion are noted below.

Issue 1: Statement of Goals
WG members stated that, though this version was both easy to understand and acceptable, that it stressed strategies, not goals.

Discussion: The WG determined that the final statement, which included "ecological integrity", was important to incorporate into the definition. The tone and the ideas from this version should also be incorporated into the final definition.

Issue 2: Inclusion Human Activities and Fishing
Some WG members suggested that a statement mentioning human activities and fishing should be entered into Version 2.

Discussion: Human activities and fishing are an integral component of the ecosystem. It was decided that specific mention of human activity is mentioned in the definition. The WG also determined that cooperative research be added to ensure that fishermen were included in research and monitoring.

PROPOSAL OF THIRD DEFINITION OF ECOSYSTEM-BASED SANCTUARY MANAGEMENT

In an effort to merge the first two proposed definitions, Peter Auster proposed a third definition. Points brought up by the WG concerning the first two versions were addressed in this version. The final, amended version of this definition can be found in Appendix B to this summary.

Definition Version 3
The amended definition of ecosystem-based sanctuary management, version 3 can be found in Appendix B. Issues raised during this discussion are noted below.

Issue 1: Addition of Sentences From Version 2
WG members wished to keep the idea that ecosystem-based sanctuary management should be adaptive.

Discussion: The WG decided that items from version 2 were important to include. The first 2 sentences from version 2 were added and then altered to fit version 3. The WG Chair called for the acceptance of the first 2 sentences as read on version 3. Both sentences were accepted.

Issue 2: Use of the Terms "Ecological Integrity" and "Diversity"
The WG debated whether terms that needed further definition should be used.

Discussion: The use of the terms ***ecological integrity*** and ***diversity*** enabled a clearer and more direct definition for ecosystem-based sanctuary management. However, the use of these terms would require further definition. The WG decided that the terms should be used but listed separately and defined at a later point.

Issue 3: Approval of Definition

After some alteration of the final sentence, the WG Chair called for approval of the final sentence. With the approval of the WG, the WG Chair then called for approval of version 3 to be the final, working definition of ecosystem-based sanctuary management. The definition was approved as written in Appendix B of this summary.

NEW BUSINESS

Straw Man Management Plans for Three Scenarios

WG members were asked to produce straw man management plans, containing specific goals, for the three scenarios mentioned from the last meeting. These scenarios are:

1. National Park protection/no extraction
2. Balanced protection and extraction
3. Sustainable extraction

Each scenario should contain the following criteria:

1. Information needs to meet goals
2. Management tools needed for implementation of management plan
3. Indicators to determine the effectiveness of each scenario

WG members were assigned as core drafters of each scenario. These members are:

Scenario 1: Peter Auster, Susan Farady, Priscilla Brooks
Scenario 2: Jon Brodziak, Les Kaufman
Scenario 3: David Pierce, David Casoni, Ed Barrett, Tom DePersia

SBNMS staff will send an email to all members to inform them of the management plan development. All those members who wish to be involved will be encouraged to contact the core drafters of the straw man management plans.

Delivery of Agenda

Members of the WG asked that meeting agendas be delivered as soon as possible. It was determined by the WG that agendas be delivered no later than one week prior to the meeting date.

Next Meeting

The WG was polled for possible dates for the next meeting. The next EBM WG meeting will be held either April 5, 2004 or April 12, 2004 in Boston.

FINAL COMMENTS

Meeting adjourned at 5:00 pm.

***Gerry E. Studds* Stellwagen Bank National Marine Sanctuary**
Management Plan Review
Ecosystem Management Working Group – Draft Agenda

Date: 23 February 2004
Location: New England Aquarium
Education Center (across from Simons IMAX theatre)
Central Wharf
Boston, MA 02110
781-424-0699

TIME	TOPICS AND OBJECTIVES
9:30-9:45	•**Welcome** (coffee and pastries provided) •**Progress update** • Review and approval of meeting summary **Discussion Leader**: John Williamson
9:45-11:00	• **Presentation: Habitat studies in the SBNMS** Peter Auster, National Undersea Research Center, Univ. of Connecticut **Objective**: Understand habitat and fish ecology research in the SBNMS
11:00-11:45	• **Presentation: Use of the SBNMS by humans and cetaceans** David Wiley, Stellwagen Bank National Marine Sanctuary **Objective**: Understand the distribution of human and cetacean use of the SBNMS
11:45-12:00	**Presentation: Ex-vessel value of fish landings from SBNMS** Craig MacDonald, Stellwagen Bank National Marine Sanctuary **Objective:** Understand the contribution of SBNMS to total ex-vessel value of fish landings
12:00-12:30	• **Presentation: SBNMS authority to regulate fishing** Edward Lindelof, National Marine Sanctuary Program, Silver Spring, MD **Objective**: Understand sanctuary's authority to regulate fishing
12:30-1:00	**Lunch- provided**
1:00-1:30	• **Presentation: Proposed definition of ecosystem-based sanctuary management** Working group scientists **Objective**: Understand rationale for definition
1:30-4:30	**Roundtable discussion of definition of ecosystem-based sanctuary management** **Objective:** Agree on a working definition
4:30-5:00	**Reiterate agreements and next steps**

APPENDIX A:

Proposed Definitions of Ecosystem-Based Sanctuary Management as Presented on February 23, 2004

Version 1, proposed by the following science members on the Ecosystem-based Management Working Group: Dr. Peter Auster, National Undersea Research Center; Dr. Jon Brodziak, Northeast Fisheries Science Center; Dr. Les Kaufman, Boston University Marine Program; and Dr. Larry Madin, Woods Hole Oceanographic Institute:

Ecosystem-based sanctuary management (EBSM) integrates scientific knowledge of ecological interrelationships to manage human impacts within sanctuary boundaries. The general goal of EBSM is to protect the ecological integrity of the Stellwagen Bank National Marine Sanctuary. Specific goals of EBSM are to: (1) maintain sustainable populations of all native species, (2) protect from human disturbance specified areas that include all native habitat types and processes across their natural range of variability, (3) maintain and monitor evolutionary and ecological processes, (4) manage long-term human impacts sufficiently to maintain the evolutionary potential of species for future generations, and (5) accommodate human uses and associated benefits within these conservation requirements.

Since the Stellwagen Bank National Marine Sanctuary is nested within Gulf of Maine large marine ecosystem, effective implementation of EBSM should: (1) consider processes that operate both inside and outside sanctuary boundaries, (2) collaborate with agencies and stakeholders at the scale of large marine ecosystems that include sanctuary boundaries, and (3) consider actions regarding any human activities that may reasonably be expected to affect the sanctuary.

Version 2 presented as text of an email from Dr. David Pierce of MA Division of Marine Fisheries, the fifth science member:

Ecosystem-based management as applied to the Stellwagen Bank Marine Sanctuary is adaptive management of the uses of sanctuary resources in a sustainable and protective way recognizing (1) the importance of species and habitat diversity and complexity and (2) that the sanctuary is not closed with respect to exchange of organisms, matter, and energy. Consequently, ecosystem-based management requires long-term collaboration with state and federal agencies and stakeholders on a large-marine-ecosystem scale, i.e., the Gulf of Maine. It entails rigorous monitoring and research performed at all levels of ecological organization to understand and learn from (1) ecological relationships of species within the sanctuary and beyond its boundaries and (2) physicochemical influences on those relationships. It requires adaptive modification of research, monitoring, and/or sanctuary rules and regulations to achieve explicit sanctuary objectives such as protecting/maintaining ecological integrity/processes and evolutionary processes/potential.

APPENDIX B:

Final Definition of Ecosystem-Based Sanctuary Management as Accepted by the Ecosystem-Based Management Working Group on February 23, 2004

Ecosystem-based sanctuary management (EBSM) integrates knowledge of ecological interrelationships to manage impacts within sanctuary boundaries. The general goal of EBSM is to protect the ecological integrity of the Stellwagen Bank National Marine Sanctuary while recognizing that the sanctuary is nested within Gulf of Maine large marine ecosystem. Effective implementation of EBSM should: (1) consider ecological processes that operate both inside and outside sanctuary boundaries, (2) recognize the importance of species and habitat diversity, and (3) accommodates human uses and associated benefits within the context of conservation requirements.